NUMBER 19

Proceedings

of

The Canadian Phytopathological Society

Eighteenth Session

June 25-28, 1951

WINNIPEG
MAN.

Issued Jan. 31, 1952

Editorial Committee

J. W. GROVES
H. R. McLARTY
L. C. CALLBECK
A. J. SKOLKO

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The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL

1950-1951

President

Wm. NEWTON, Laboratory of Plant Pathology, Saanichton, B.C.

Vice-President

G. H. BERKELEY, Laboratory of Plant Pathology, St. Catharines, Ont.

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A. J. SKOLKO, Division of Botany and Plant Pathology, Science Service, Ottawa, Ont.

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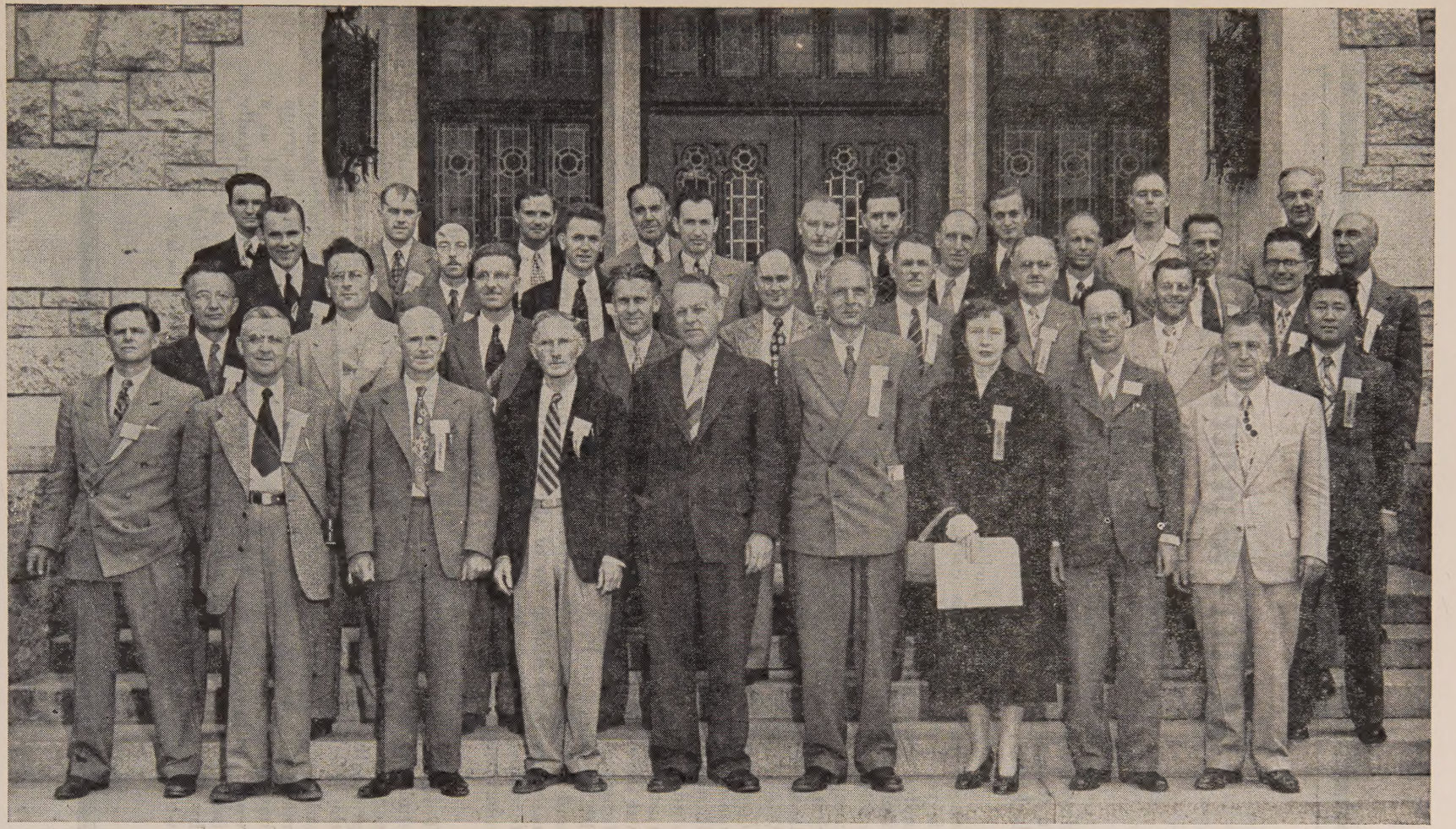
M. W. CORMACK, Laboratory of Plant Pathology, Lethbridge, Alta.
D. J. MacLEOD, Laboratory of Plant Pathology, Fredericton, N.B.

Copies of the Proceedings of the Canadian Phytopathological Society may be obtained from the Secretary-Treasurer at a price of 50c each.



Front Row : L. to R. — B. Peturson, D. J. MacLeod, R. C. Russell, T. Johnson, W. Popp, W. Newton, Miss C. McKeen, T. C. Vanterpool, L. W. Koch, Y. S. Wu. Second Row : W. J. Cherewick, H. M. Good, W. A. F. Hagborg, R. J. Ledingham, M. N. Grant, M. W. Cormack, W. L. Gordon, S. B. Hrushovetz, S. G. Fushtey, G. H. Berkeley. Third Row : N. S. Wright, L. C. Callbeck, D. A. Quirke, D. M. MaceLod, B. J. Sallans, W. F. Hanna, E. J. Hawn, A. J. Skolko. Last Row W. C. McDonald, J. L. Slykhuis, G. J. Green, J. E. Machacek, W. E. Sackston, H. T. Dirks, T. R. Davidson, H. A. H. Wallace.

Annual Meeting, C.P.S., Winnipeg, Man., June 25-28, 1951.

Herbert Spencer Jackson

1883 - 1951

Canadian botanists lost a distinguished leader and the Canadian Phytopathological Society an illustrious charter and Honorary member in the sudden death at Toronto on December 14th of Professor H. S. Jackson.

Herbert Spencer Jackson was born in 1883 in Augusta, N.Y. where he received his early education. He was awarded the B.A. degree from Cornell University in 1905 and while at Cornell came under the influence of Professor G. F. Atkinson, who recognized in him one born to be a systematic mycologist and encouraged him to study further with Farlow and Thaxter at Harvard. He did not complete the Ph.D. degree at this time, since he went to the Oregon State College as Professor of Botany and Plant Pathology. Much later, in 1929, the Ph.D. was conferred on him by the University of Wisconsin on presentation of his classic paper, "*Present Evolutionary Tendencies and the Origin of Life Cycles in the Uredinales*". He remained at Oregon until 1915, when he became Chief Botanist at the Purdue Experiment Station where he devoted himself to taxonomic studies in the Rusts and Smuts and to the investigation of cereal rust problems. He was at Purdue for 14 years and during this interval developed an international reputation as an authority on the rust fungi and assembled outstanding collections of rusts and smuts. In 1929 he became Professor of Mycology in the University of Toronto and for the rest of his career devoted himself entirely to mycological research, the building up of the Toronto herbarium and to graduate teaching, although in 1941 he became Head of his department and administered it until his death.

In the environmental sequence in which he found himself in Toronto, the rust flora was conspicuously lacking in species the study of which might have contributed significantly to the phylogenetic problems in which he was interested. Consequently, he gradually shifted his emphasis and undertook the investigation of the Thelephoraceae as the field of his intensive effort. The many substantial and varied contributions which he and his students have made through the years to the taxonomy and bionomics of this group have once again, as in the rusts, caused him to be recognized as a world authority on the Thelephoraceae. He continued to be broadly interested in mycology and especially in phylogeny, as is evidenced by the paper on "*Life Cycles and Phylogeny in the Higher Fungi*" which he offered in 1944 as a presidential address before Section V

of the Royal Society of Canada. In 1950 Dr. Jackson brought together under the title "*Opuscula Jacksoniana, Uredinales and Ustilaginales*" some fifteen sets of 31 separates of his journal papers dealing with the rusts and smuts, including those of joint authorship, which appeared during the years 1908-1944. He had hoped later to issue a companion volume including the studies on the Thelephoraceae by himself, his students and collaborators. These already numbered eight individual contributions and a series of eight additional ones which appeared in the Canadian Journal of Research from 1948 to 1951 under the general title "*Studies of Canadian Thelephoraceae*". It is hoped that several partially completed manuscripts belonging to this series can be completed and published by his colleagues.

Dr. Jackson was very modest and self-effacing, understanding and kindly, one with whom friendship developed slowly but was an exceedingly rewarding experience. He will be universally mourned as a scholar and truly great man of his science, and deeply and lastingly so by all who called him friend.

Dr. Jackson is survived by his wife, Edythe Doyle Jackson, an understanding and cooperative helpmeet who contributed greatly to his scientific achievement and his happiness; a daughter, Mrs. C. D. Barrett of Imlay City, Mich., and a son, Dr. K. K. Jackson of Ithaca, N.Y. To them, the members of the Canadian Phytopathological Society tender a sincere tribute to the one they have lost and a deep and understanding sympathy in their bereavement.

D. L. BAILEY.

Constance Gwendolyn McKeen

1925 - 1951

Miss Connie McKeen, the daughter of Mr. and Mrs. C. G. McKeen of Hagersville, Ontario, was born in Hamilton, April 30, 1925. She was graduated from McMaster University with Honours in 1946 and carried out post-graduate studies in the Department of Botany, University of Toronto during 1946-47. Her thesis, entitled "A cultural and taxonomic study of three species of *Peniophora*" was completed in 1948 when she was granted the M.A. degree by the University of Toronto. She joined the staff of the Division of Botany and Plant Pathology, Ottawa, in June 1947 where her work, mainly cultural studies on Hymenomycetes that cause decay in forest trees, was of a consistently high quality.

Miss McKeen was a member of the Canadian Phytopathological Society and attended its meetings in Winnipeg in June 1951, where she presented a paper entitled "A cultural and taxonomic study of three species of *Peniophora*", and was appointed a member of the committee on nomenclature. Following the meetings she travelled West on a combined business and vacation trip, during which she spent some time at the Laboratories of Forest Pathology in Saskatoon and Victoria, assisting in the sorting and identification of cultures of wood-rotting fungi. On August 3 while on a cruise to Alaska on the Canadian National Steamship, Prince George, she lost her life by drowning.

Miss McKeen had already demonstrated excellent research ability and had given promise of high attainment in this field. To her work and to her many other interests which included sports in which she participated and music for which she had deep appreciation, she brought great enthusiasm and gaiety that made association with her a happy and rich experience.

M. K. NOBLES.

MINUTES OF THE EIGHTEENTH MEETING HELD AT WINNIPEG, MANITOBA, JUNE 25 TO 28, 1951

Business Sessions : June 27 and June 28

The first business session of the 18th meeting of the C.P.S. was held in the Arts Building of the University of Manitoba, Winnipeg, on June 27.

The presidential address by Dr. Wm. Newton had previously been distributed to members in attendance.

The minutes of the 17th meeting, which have been published in the proceedings of the society, were adopted on motion of Dr. W. F. Hanna and seconded by Dr. W. E. Sackston.

A detailed report on the inaugural meeting of the Canadian Society of Microbiologists, prepared by Prof. A. R. Walker and reproduced below, was presented. In the report it was noted that the C.P.S. was requested to name one representative to the Council of the Canadian Society of Microbiologists. A motion authorizing the Council of the C.P.S. to appoint a representative was proposed by Dr. W. F. Hanna, seconded by Dr. W. A. F. Hagborg. The motion was carried.

The invitation from Laval University to the C.P.S. to hold its 1952 meetings in Quebec City in connection with the centenary of the founding of the University was discussed but in view of the close association with the Agricultural Institute of Canada which the C.P.S. has enjoyed and the fact that the A.I.C. had previously committed the 1952 meetings to Ottawa it was felt that the invitation from Laval University could not be accepted. The Secretary was instructed to extend the thanks of the C.P.S. and express our regret in declining the invitation. A motion to this effect, proposed by Dr. L. W. Koch and seconded by Dr. D. J. MacLeod, was carried.

A letter from Dr. G. A. Ledingham, who had been appointed as official delegate of the C.P.S. to the 5th International Congress on Microbiology, held in Rio de Janeiro in 1950, was read. Dr. Ledingham mentioned that all meetings were conducted in Spanish or Portuguese but that abstracts of papers presented at all the meetings are available.

Dr. W. A. F. Hagborg reported that a committee on terminology in plant pathology had been set up at the 7th International Botanical Congress, held in Stockholm, Sweden, during July, 1950, as a result of a proposal of the Terminology Committee of the C.P.S. which was presented at the International Botanical Congress by Dr. Hagborg.

The report of the Secretary-Treasurer was read and adopted on motion of Dr. W. J. Cherewick and Dr. G. H. Berkeley.

The report of the Custodian of the Library and Records was read and adopted on motion of Dr. T. Johnson, seconded by L. C. Callbeck.

The report of the Editorial Committee was presented by L. C. Callbeck and adopted on his motion, seconded by Dr. W. E. Sackston.

The report of the Nominating Committee was read by Dr. D. J. MacLeod. The report was adopted on motion of Dr. MacLeod, seconded by L. C. Callbeck.

The election of members of the Nominating Committee for the coming year returned the following members:

Dr. Wm. Newton, Dr. D. J. MacLeod, Dr. L. W. Koch, Dr. W. C. Broadfoot, and Prof. T. C. Vanterpool.

The business session reconvened on June 28.

The report of the Terminology Committee was read by the Secretary and Dr. A. W. Henry's motion of adoption of the report was seconded by Dr. W. A. F. Hagborg. Carried.

Honoraria for stenographic assistance to the Secretary-Treasurer in the amount of $20.00 and for assistance to the chairman of the Program and Publicity Committee amounting to approximately $10.00 were approved.

The following applications for membership were unanimously accepted: Margaret Elizabeth Barr, Sydney E. Brown-John, John Edgar Browne, Walter Robert Childers, Earl Joseph Doyle, Marshall Nelson Grant, J. Bernard Julien, Donald Alexander McTavish, Ludwig Piening, Dennis A. Quirke, Edgar Thornton Reeder, Daniel James Samborski, John Bertrand Teir, Doreen E. Wells.

The report of the Resolutions Committee was presented by Dr. W. F. Hanna and was adopted on motion of Dr. Hanna and Dr. W. J. Cherewick.

The retiring president, Dr. Wm. Newton, then turned the meeting over to the new president, Dr. G. H. Berkeley. Dr. Berkeley expressed his pleasure in the honour conferred upon him by the Society and promised that he would strive for the expansion of the activities of the Society.

Dr. Berkeley announced the following committee appointments for the year 1951-52: *Publicity and Program:* R. J. Baylis (Chairman), J. C. Perrault, J. G. Coulson, R. S. Willison, and A. J. Skolko.

Resolutions: J. F. Hockey (Chairman), J. L. Howatt, and R. O. Lachance.

Editorial: J. W. Groves (Chairman), H. R. McLarty, L. C. Callbeck, and A. J. Skolko.
Terminology: A. W. Henry (Chairman), D. C. Buckland, J. H. Craigie, W. A. F. Hagborg, D. L. Bailey, B. H. MacNeill, H. M. Good, R. S. Willison, R. A. Ludwig, W. E. McKeen, W. A. Hodgson, C. D. McKeen, R. Pomerleau, L. E. Tyner, M. F. Welsh, and T. C. Vanterpool.

Disease Diagnosis: W. Newton (Chairman), W. F. Hanna, P. M. Simmonds, G. B. Sanford, M. F. Welsh, J. D. Gilpatrick, R. E. Fitzpatrick, and L. W. Koch.

Custodian of Library and Records: T. Johnson.

Representative to Canadian Society of Microbiologists: A. R. Walker.

Nomenclature: W. J. Cherewick (Chairman), I. L. Conners, J. W. Groves, J. J. Miller, W. L. Gordon, and Constance McKeen.

Auditors: J. W. Groves and M. K. Nobles.

Regional Representatives:

G. W. Ayers	—	Maritimes
Rene Pomerleau	—	Eastern Quebec
S. M. Pady	—	Western Quebec
R. J. Baylis	—	Eastern Ontario
J. J. Miller	—	Western Ontario
W. A. F. Hagborg	—	Manitoba
T. C. Vanterpool	—	Saskatchewan
M. W. Cormack	—	Alberta
I. C. MacSwan	—	B. C. Mainland
R. E. Foster	—	Vancouver Island

REPORT OF THE REPRESENTATIVE TO THE CANADIAN SOCIETY OF MICROBIOLOGISTS

The inaugural meetings of the proposed Microbiological Society were held at the University of Ottawa, June 7, 8, where papers of a volunteer nature were presented and plans for organization considered. Some 27 papers were presented. The program of these meetings was supposed to be sent to the phytopathologists' mailing list. Each laboratory should have received at least one of these programs. You have perhaps all seen this program.

As the program shows, each morning was divided into two parts — presentation of papers and business session. The afternoons were devoted to presentation of

papers. Thursday evening a dinner was held at Standish Hall, Hull. No formal program was supplied and guests were free to spend the evening there or eslewhere as they chose. The organization committee appointed at the first business session spent the evening making plans to present to the business session Friday morning. About two hundred attended the dinner and this fairly well indicates the number attending meetings.

The discussion at the first business session indicated a strong interest in the organization of Canadian microbiologists. I pointed out that many pathologists favoured some sort of organization or federation. I emphasized, as I did in our informal meetings throughout the year, that whatever form the organization took we must preserve the complete autonomy of the Canadian Phytopathological Society and any other groups now existent or subsequently formed.

The secretary's minutes are not yet available so I will report briefly on the progress of the business sessions and organization committee meetings.

1. It was decided to form an organization to be called "The Canadian Society of Microbiologists."

2. A slate of officers was elected consisting of:

President — **Dr. R. G. E. Murray, (general & medical)**
Professor of Bacteriology,
University of Western Ontario,
London, Ontario.

Vice-president 1. — **Dr. A. G. Lochhead, (agricultural) qq qq**
Chief, Division of Bacteriology,
Science Service,
Department of Agriculture,
Ottawa, Ontario.

2. — **Dr. M. Panisset, (veterinary)**
Institut de Microbiologie,
University of Montreal,
Montreal, P.Q.

Secretary-Tearsurer — **Dr. N. E. Gibbons, (food, general)**
Division of Applied Biology,
National Research Council,
Ottawa, Ontario.

Council

Agricultural (3)

Dr. H. L. Berard, (dairy)
Provincial Dairy School,
St. Hyacinthe, Que.

Dr. N. James, (soil)
University of Manitoba,
Winnipeg, Manitoba.

Prof. E. H. Garrard, (agricultural)
Professor of Bacteriology,
Ontario Agricultural College,
Guelph, Ontario.

Medical (2)

Dr. M. Saint Martin, (Public Health)
Ministry of Health Laboratories,
1570 St. Hubert Street, Montreal, P.Q.

Dr. C. E. Van Rooyen,
Connaught Med. Res. Laboratory,
Toronto, Ontario.

Veterinary (1)

Dr. R. Gwatkin,
Animal Diseases Research Inst.,
Hull, P.Q.

Parasitology (1)

Dr. A. M. Wallis,
Ontario Research Foundation,
Toronto, Ontario.

Mycology, Botany, Phytopathology (2)

Dr. G. A. Ledingham, (Mycology)
Prairie Regional Laboratory,
Saskatoon, Sask.

Mr. I. L. Conners, (Mycology)
Division of Bot. & Plant Pathology,
Science Service,
Dept. of Agriculture, Ottawa, Ont.

Industrial (2)

Mr. A. D. Bailey,
Canadian Breweries Limited,
Fleet Street, Toronto, Ontario.

Mr. R. D. Henderson,
Research & Development,
Merck & Co., Valleyfield, Quebec.

Microbiological Chemistry (1)

Dr. J. H. Ouastel,
Montreal General Hospital,
Research Inst.,
Montreal, Que.

In addition the Canadian Phytopathological Society and the Laboratory Section of the Public Health Association were each to be invited to name one additional representative to the council.

3. Membership was to be open to all interested microbiologists of University graduation level. Names of interested microbiologists might be proposed by two members of the organization. Dues are to be determined by the nwely appointed executive and council. The N.R.C. has intimated considerable interest in the new society and may perhaps assist it somewhat. This would help keep dues low.

4. Meetings should be once per year. The time and place of meetings to be decided by the new executive. It was expressed as a hope that arrangements could be made to hold meetings at the same time and place as existing societies — namely the Phytopathological Society and the Laboratory Section of Public Health.

A. R. WALKER.

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members:

I have the honour to present herewith the report of the Secretary-Treasurer for the fiscal year ending May 31, 1951.

The seventeenth meeting of the Canadian Phytopathological Society, held in Charlottetown, P.E.I., June 26-30, 1950, has been reported in Proceedings No. 18 of the Society issued on Jan. 27, 1951.

Three issues of the C.P.S. News were distributed during the year. I would like to take this opportunity to thank those who have contributed to the News and to strongly recommend to regional group representatives that information suitable for publication in the News be forwarded to the Secretary if the C.P.S. News is to be continued.

The membership of the Society has reached a new high of 167 and applications have been received from 13 prospective members. (23 unpaid, hence 144 members as compared with 133 last year).

Attached is a financial statement which shows a favourable balance of $361.09 as compared with a balance of $249.57 for last year.

Respectfully submitted,

A. J. SKOLKO,
Secretary-Treasurer.

FINANCIAL STATEMENT
CANADIAN PHYTOPATHOLOGICAL SOCIETY

June 1, 1950 to May 31, 1951.

Revenue:

Balance brought forward			$249.57
Fees:			
1949-50	$ 22.00		
1950-51	261.00		
1951-52	17.00		
		$300.00	
Interest on bond		7.50	
Sale of Proceedings		12.46	
			$319.96
			$569.53

Expenditures:

Printing of Proceedings No. 18	$129.20	
Honoraria for stenographic assistance	30.00	
Postage	31.00	
Stationery	.60	
Expenses re Annual Meeting	16.75	
Bank charges and exchange	.89	
		$208.44
Balance (on hand) May 31, 1951		$361.09

Additional Asset:

Dominion of Canada 3% Victory Bond (Series K8Z32643)	$500.00

Audited and found correct,

(Signed) M. K. NOBLES
J. WALTON GROVES

REPORT OF THE CUSTODIAN OF THE LIBRARY AND RECORDS OF THE SOCIETY

Accessions to the library during the past year include some 80 bulletins and reprints that were acquired by the Society during the first few years of its existence and had been kept, since then, at the Division of Botany and Plant Pathology, Ottawa. These publications were numbered and indexed as soon as received. Files of correspondence covering the years 1929 to 1933 were also received and were added to the records of the Society except for certain items of no permanent interest that were discarded.

A copy of Dr. Roderick Sprague's book "Diseases of Cereals and Grasses in North America" was presented to the Society for review purposes.

The library at present contains 437 items, an increase of 134 accessions since last year.

A zinc plate of the group photograph taken at last year's meeting at Charlottetown was received for the records of the Society.

T. JOHNSON.

REPORT OF THE EDITORIAL COMMITTEE

The Proceedings of the Seventeenth Session of the Canadian Phytopathological Society were issued on January 27, 1951. They contain the report of the meeting held at Charlottetown, P.E.I., June 26-30, 1950, and a group photograph of those attending as well as thirteen abstracts of papers presented at the meeting, a review of the book Diseases of Cereals and Grasses in North America by Roderick Sprague, and a list of papers published by members of the society between June 1, 1949 and May 31, 1950.

The Chairman of the Committee wishes to express his thanks to Dr. A. J. Skolko who willingly and efficiently took over and carried out the duties which he himself was prevented from attending to by illness.

Respectfully submitted,

L. C. CALLBECK
R. E. FITZPATRICK
A. J. SKOLKO
J. W. GROVES (Chairman)

REPORT OF THE NOMINATING COMMITTEE FOR 1950-51

Requests for nominations were sent to the members of the Nominating Committee on January 31, 1951. A list of the nominees for the several offices was issued on February 12, 1951. On final ballot, February 21, 1951, the following received the unanimous vote of the Committee:

President	Dr. G. H. Berkeley
Vice-President	Dr. J. C. Perrault
Secretary-Treasurer	Dr. A. J. Skolko
Councillors	Dr. W. Newton, Dr. W. F. Hanna

Respectfully submitted by the Nominating Committee,

A. W. HENRY
L. C. CALLBECK
G. W. AYERS
R. O. LACHANCE
D. J. MacLEOD (Chairman)

REPORT OF THE TERMINOLOGY COMMITTEE OF THE C.P.S.

The work of the Terminology Committee during the past year embraced two activities: (1) an attempt to obtain international action in relation to the adoption and revision of the terminology of Plant Pathology and (2) a survey of plant pathological terms, (not mycological terms or scientific names) in recent glossaries.

International action was sought at the VII International Botanical Congress held in July at Stockholm, Sweden. We were represented at this congress by Dr. W. A. F. Hagborg who made a motion at a meeting of the Section of Plant Pathology "That a committee on standardization of technical words be set up by the Executive Committee (of the Section of Plant Pathology, I.B.C.) to report to the next International Botanical Congress." This motion passed without opposition. It was understood that the Executive Committee of the Section of Plant Pathology of the I.B.C. would set up the committee covered by the motion and that it would probably ask the C.P.S. to name a member of this committee.

In the survey work undertaken by our committee, the field was divided into twelve sub-fields. Each of these was assigned to a different member of the Terminology Committee who was asked to examine as many plant pathological terms as possible and to report on the suitability of definitions of these as presently used. Suggested improvements in the definitions or even new terms were requested where these appeared to be needed. Considerable progress was made toward an improved

list of technical words in Plant Pathology. Some branches of the subject were covered rather thoroughly, others less so, but altogether a good beginning was made. The list assembled should provide a valuable structure for further work of subsequent committees. It is recommended that the work be continued and that it be tied in as soon as possible with that of the committee of the Section of Plant Pathology of the International Botanical Congress.

Respectfully submitted,

D. L. BAILEY
D. C. BUCKLAND
J. H. CRAIGIE
H. M. GOOD
W. A. F. HAGBORG
W. A. HODGSON
C. D. McKEEN
R. POMERLEAU
L. E. TYNER
M. F. WELSH
T. C. VANTERPOOL
A. W. HENRY (Chairman)

REPORT OF RESOLUTIONS COMMITTEE

Whereas the Canadian Phytopathological Society has held its 18th Session at Winnipeg, June 25-28, 1951, in conjunction with the Annual Convention of the Agricultural Institute of Canada, and whereas the accommodation and facilities placed at the disposal of the Society have contributed notably to the success of the Session:

Be it resolved that we extend our sincere appreciation to:

(1) Our hosts the Winnipeg Branch of the Agricultural Institute of Canada.

(2) The University of Manitoba, for excellent living accommodation and the use of lecture rooms.

(3) To Dr. W. E. Sackston, Chairman, Program and Publicity Committee, and members of his Committee for preparing the program and making arrangements for the annual dinner.

(4) To Line Elevators Farm Service, Winnipeg, for generously entertaining members of the Society on the evening of the annual dinner.

(5) To Dr. J. J. Christensen, special speaker, for attending our Session and contributing two most interesting and informative addresses.

W. F. HANNA
W. J. CHEREWICK
Resolutions Committee.

ABSTRACTS OF PAPERS PRESENTED AT THE EIGHTEENTH MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

GLADIOLUS VIRUSES

G. H. BERKELEY, Dominion Laboratory of Plant Pathology, St. Catharines, Ontario.

In the fall of 1949 corms were selected from different varieties of gladiolus which showed varying degrees of mottle and streak symptoms and from Mrs. Mark's Memory with prominent chlorotic rings and line patterns.

In the spring of 1950 these corms were planted and when the sprouts were 1" to 2" long they were cut off and macerated in a mortar with pestle and the juice used as inoculum.

By this method several viruses have been isolated and these have been tentatively identified as three strains of the tobacco ring spot virus, and one each of the tobacco mosaic and cucumber mosaic viruses. Identification was based on symptomatology on *Nicotiana tabacum, N. glutinosa, Datura stramonium,* pea, bean, snapdragon, petunia, tomato, and pepper, and on thermal inactivation and cross protection tests.

The tobacco mosaic strain was obtained on 2 occasions, along with strains of the tobacco ring spot virus, from a single plant of Mrs. Mark's Memory variety. Whether or not the unusual symptoms on this variety were caused by this virus complex is not known. There is some evidence that other varieties may also be infected with more than one virus. Therefore mixtures of viruses may not be uncommon in gladiolus.

The cucumber mosaic strain was isolated from an unknown variety showing severe greyish streaking and stunted growth.

Strains of the tobacco ring spot virus have been isolated from Picardy, Aladdin, Spotlight, Mrs. Mark's Memory and two unknown varieties, thus indicating a rather wide distribution of these strains in our stocks at St. Catharines.

Inoculations back to gladiolus have so far been unsatisfactory since too high a percentage of the checks have shown disease symptoms. At the time seedlings were not available and plants were selected purely on apparent absence of symptoms. Recently, however, a large number of small seedings have been inoculated by the juice transfer and vacuum techniques.

TURNIP MOSAIC

G. H. BERKELEY and M. WEINTRAUB, Dominion Laboratory of Plant Pathology, St. Catharines, Ontario.

In 1946 a mosaic disease of turnips was encountered in Ontario near Walkerton. Since then the disease has spread to other turnip growing districts.

The virus nature of this disease was established in 1946. The virus was readily transmitted by juice transfer methods to *Nicotiana tabacum, N. glutinosa,* turnip, cabbage and chinese cabbage. On tobacco only primary symptoms develop whereas the other hosts became systemically affected.

The virus has been purified by chemical means and the isoelectric point has been tentatively placed between pH 4.5 and pH 5.0. This constitutes the first purification of a virus of the turnip mosaic type. It is interesting to note that the pH of turnip sap is about 4.5, i.e. very close to the isoelectric point of the virus itself.

Several different mosaic diseases of crucifers have been reported in the literature. Whether the Ontario disease is similar to one already described, or a new disease, remains to be ascertained. Before identification is possible the symptomatology on a more extensive host range, and certain physical properties of the virus, must be established.

Epidermal peelings of infected turnips (*Brassica campestris* L. var. Laurentian) and *Nicotiana glutinosa* leaves were examined after immersion in 0.5% Trypan blue and 0.5% phloxine and were found to contain amoeboid inclusions (up to 30 u x 10 u) in the subveinal epidermis. This is the first record of inclusion bodies being associated with a mosaic disease of turnip.

THE EFFECT OF ZINC-CONTAINING LATE BLIGHT FUNGICIDES ON THE GROWTH AND YIELD OF POTATOES

L. C. CALLBECK, Dominion Laboratory of Plant Pathology, Charlottetown, P.E.I.

Accumulated data from potato spray tests reveal that zinc-containing fungicides commonly produce high yields even though the degree of disease control, in many

cases, is inferior to that of the copper fungicides. Studies to ascertain whether or not zinc stimulates growth or satisfies a minor element deficiency are now being made at Charlottetown.

Tests have shown that seed pieces dipped in a solution of zinc sulphate emerge earlier than untreated seed pieces and that plants from zinc-treated sets make stronger growth, blossom earlier, and produce higher yields. Spray tests indicated that increased yields may be expected when the plants are treated with zinc sulphate sprays and that the addition of this compound to copper sprays improves their fungicidal properties.

CROWN ROTS OF ALFALFA

M. W. CORMACK and E. J. HAWN, Dominion Laboratory of Plant Pathology, Lethbridge, Alberta.

Two distinct types of crown rot occur in alfalfa in Alberta. Winter crown rot caused by an unidentified low temperature basidiomycete is widespread and often severe in the central and northern areas. It is much less common under the winter chinook conditions in southern Alberta, but extensive damage occurs there through rotting of the crown buds during the growing season. In a detailed survey of 7 young stands in 1950, the average percentage of infected plants increased from 1.3 in May to 75.6 in October. Infection studies are in progress on *Fusarium* spp. and *Rhizoctonia solani* which are consistently associated with this damage.

INCIDENCE OF POTATO TUBER LEAF-ROLL PHLOEM NECROSIS AS INFLUENCED BY INFECTION

T. R. DAVIDSON, Dominion Laboratory of Plant Pathology, Edmonton, Alta.

Thirty healthy potato plants each, of the varieties Carter's Early Favourite, Netted Gem, and Canus, were grafted at ten-day intervals, beginning May 26 to August 25, 1950, with leaf-roll infected scions from indexed potato plants. A high percentage of the plants grafted before mid-July developed easily recognizable foliage symptoms of leaf-roll. However, despite infection, the symptons became increasingly difficult, and finally impossible, to detect in the plants grafted after August 1. Tuber phloem necrosis was absent in Canus, most severe in Carter's Early Favourite, and intermediate in Netted Gem. The results emphasize the difficulties of ordinary field inspection in detecting leaf-roll infection.

STUDIES ON INFECTION OF RYE BY CLAVICEPS PURPUREA

S. G. FUSHTEY, Dominion Laboratory of Plant Pathology, Edmonton, Alberta.

An attempt in 1950 to produce ergot on a commercial scale in the sedge moss areas of north-central Alberta was unsuccessful, despite favourable environmental conditions. However, a maximum estimated yield of 166 pounds per acre was obtained on adjacent plots when the inoculum was applied to the open flowers by means of a hand sprayer during mid-morning on three consecutive days. Definitely less infection was secured from inoculations made during mid-afternoon than from those made during mid-morning, and also less from one, than from two and three inoculations on consecutive days.

THE CARBON DIOXIDE CONTENT OF THE AIR IN LIVING MAPLE TRUNKS IN RELATION TO HEART ROT

H. M. GOOD and D. G. THACKER, Queen's University, Kingston, Ont.

The internal air of maple trunks was found to vary considerably in composition, particularly in decaying trees. In all cases carbon dioxide occurred in much larger amounts than in the atmosphere.

Growth in culture of the eight maple rot fungi tested was favoured by carbon dioxide. In several cases optimum concentrations of this gas were of the order of 10%, growth being approximately twice that in carbon dioxide free air.

Distilled water extracts of the dark invasion zone, which regularly surrounded decayed areas, were consistently alkaline, often giving a pH above those tolerated by the fungi in culture. Carbon dioxide, in concentrations found in maple trees, reduced the pH of extracts of the invasion zone to levels found suitable for growth of the rot organisms.

THE PERFECT STAGE OF RHIZOCTONIA SOLANI FROM FLAX

E. J. HAWN and T. C. VANTERPOOL, Dominion Laboratory of Plant Pathology, Lethbridge, Alberta.

A fungus having the accepted characters of *Rhizoctonia solani* Kühn, except that its sterigmata are three times as long as those of *Pellicularia filamentosa* (Pat.) Rogers, is commonly the cause of a seedling blight of flax. Single basidiospore lines differ culturally and pathogenically among themselves and from the parent. Some single-spore cultures have fruited. Preliminary matings of sterile single-spore cultures remained sterile. Thus the fungus is presumably heterozygous and homothallic. The stages in the formation of the perfect stage agree with those described for *Pellicularia* species. Preliminary cytological studies indicate that the diploid nucleus contains 12 chromosomes. The taxonomic position of the flax strain still remains to be settled.

EFFECTS OF AMINO ACIDS ON THE PATHOGENICITY OF HELMINTHOSPORIUM SATIVUM

S. B. HRUSHOVETZ, Dominion Laboratory of Plant Pathology, Edmonton, Alberta.

Paper chromatography methods have shown that there is a marked difference in concentration of certain free amino acids in healthy and diseased wheat roots. Greenhouse experiments have shown that the pathogenicity of *Helminthosporium sativum* to wheat seedlings may be markedly influenced by varying the kind of amino acid added to the agar substratum that is used in culturing the fungus.

SURVEY OF CEREAL RUST SITUATION

T. JOHNSON, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

NEMATODES, A FACTOR IN THE RE-ESTABLISHMENT OF PEACH TREES IN SOUTHWESTERN ONTARIO

L. W. KOCH and H. R. BOYCE, Dominion Laboratory of Plant Pathology, Harrow, Ontario.

An investigation was undertaken to determine the factors responsible for the difficulty in re-establishing peach trees in part of an existing laboratory orchard where a block of apricot trees had been recently removed. The case under investigation was representative of a similar and increasingly prevalent condition in southwestern Ontario wherever there has been attempted the re-establishment either of individual peach trees in existing orchards or of entire orchards in soils where peach trees have been recently removed.

The replanted peach trees which were placed in rows previously occupied by sweet cherries all survived while, on the other hand, those replanted in "apricot" rows either died or made subnormal growth. Examinations of root systems of affected peach trees disclosed the presence of numerous lesions on the finer laterals. Certain root lesions were apparently caused by the black peach aphis, *Anuraphis persicae—niger* (Smith). Evidence of fungus invasion of certain of the newer root tissues was also observed. However, the greatest damage appeared to be consistently

associated with high nematode populations in the smaller rootlets. For the most part the nematodes belonged to *Pratylenchus* spp. Greenhouse tests involving the soils in question have indicated the invasion on root laterals by nematodes as early as 24-48 hours after they emerge from parent root tissues.

THE CHELATES AND THEIR METAL COMBINATIONS AS FUNGICIDES

L. E. LOPATECKI and W. NEWTON, Dominion Laboratory of Plant Pathology, Saanichton, B.C.

Two chelates, cupferron and phenolthiohydantoic acid, proved to be strongly fungistatic, but of little value as fungicides because of their high solubility. The mercury combinations are sufficiently stable to give promise as fungicides, and proved to be as effective as Arasan in the protection of pea seedlings against damping-off by *Pythium ultimum.*

The evolution of H_2S from nabam in the presence of acid has been demonstrated and accounts in part for its fungicidal effect. No H_2S is evolved from ferbam and ziran under like conditions. These latter fungicides decompose with the production of CS_2 gas and dimethylamine.

RELATION OF MARKET GRADE TO GERMINATION OF TREATED OR UNTREATED SEED OF WHEAT, OATS, AND BARLEY

J. E. MACHACEK and H. A. H. WALLACE, Dominion Laboratory of Plant Pathology, Winnipeg, Manitoba.

Tests made in soil in the greenhouse on groups of seed samples of the 1950 crop representing 6 statutory or commercial grades of wheat, 7 grades of oats, and 6 grades of barley (50 samples each), showed that in both untreated seed and seed treated with Ceresan M, there was a progressive decrease in germination with decrease in grade. This trend is attributed largely to damage from frost, as for each grade the percentage of seedlings showing frost injury almost equalled the difference between the total of seeds germinating and the total producing normal seedlings.

Treating the seed with Ceresan M improved normal germination by 14.6% in wheat, 14.7% in oats, and 10.0% in barley, considering all grades. In wheat, the improvement was greatest in the highest grade and least in the lowest grade, while in oats the trend was the opposite, and in barley it was variable.

Storing treated wheat seed for a month in sealed bottles greatly increased the percentage of seedlings showing mercury poisoning. The percentage was highest in No. 1 Northern, declining to a low in No. 4 Northern and then rising in No. 5 and No. 6. The amount of injury seemed to be related to bushel weight, the most injury occurring in heavy seed and the least in light seed.

TESTING OF POTATOES FOR RESISTANCE TO VIRUS DISEASES

D. J. MacLEOD, R. H. BAGNALL and D. F. RANKIN, Dominion Laboratory of Plant Pathology, Fredericton, N.B.

The breeding and testing of potatoes for resistance to virus diseases was begun in 1933 in a co-operative project between the Dominion Laboratory of Plant Pathology and the Dominion Experimental Station, Fredericton, N.B.

Immunity and field resistance to the following viruses was sought: Solanum virus 1 (X virus), Solanum virus 2 (Y virus), Solanum virus 3 (A virus), Solanum virus 4 (B virus), and Solanum virus 14 (leaf roll virus). Immunity to Solanum virus 1 has been confirmed in four seedlings of American origin. Field resistance (host hypersensitivity) to Solanum viruses 1, 2, 3 and 4 has been found in a number of commercial varieties and certain new seedlings. Hypersensitivity to Solanum viruses 1, 2, 3 and 4 has proven more valuable than host tolerance for the control

of these viruses under commercial field conditions. Hypersensitivity to Solanum virus 14 was not found in any of the seedlings examined. A transitory type of field resistance was evident in certain seedlings which conditioned these potatoes to withstand exposure to the leaf roll virus under field conditions for varying periods of time up to seven consecutive seasons. Protective inoculation with an avirulent strain of Solanum virus 1 to protect potatoes from the effect of virulent strains has been explored.

The testing of potatoes was conducted under both field and greenhouse conditions. Standard methods were used for determining the resistance to Solanum viruses 1, 2, 4, and 14. A special technique was developed for testing the resistance to Solanum virus 3. Purified sources of these viruses were used in connection with these trials. Solanum viruses 2, 3 and 14 were transmitted by means of the aphid *Myzus persicae* and Solanum viruses 1 and 4 were introduced by grafting and sap inoculation.

The testing for resistance to viruses was complicated by the following factors — differences among varieties in their reaction to certain viruses; the similarity of the symptoms produced by different viruses as well as the similarity of certain virus symptoms to manifestations of non-virus origin; the existence of virus strains; the masking effect of certain weather and environmental conditions on symptom expression; variations in insect vector infestation and the inconsistency with which the vector transmitted certain viruses to some of the potatoes under test.

A CULTURAL AND TAXONOMIC STUDY OF THREE SPECIES OF PENIOPHORA

Constance McKEEN, Division of Botany and Plant Pathology, Science Service Building, Department of Agriculture, Ottawa, Canada.

Three species of *Peniophora, P. heterocystidia, P. mutata,* and *P. populnea* similar in general morphology and in the production of conidiophores in artificial culture are redescribed. Cultural studies have shown that the three species are heterothallic, bipolar, and incompatible. Within *P. mutata* two groups have been demonstrated, those occurring on *Populus* being completely incompatible, or only partially compatible, with those on other broad-leaved trees. The occurrence of conidiophores in fruit bodies of *P. heterocystidia* in nature is reported for the first time.

SYMPTONS OF FROST INJURY TO BARLEY EMBRYOS AND SEEDLINGS

R. C. RUSSELL, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

A description was given of symptoms of frost injury discovered in the embryos of barley seed from crops which were exposed to summer frosts while the grain was immature. Corresponding symptoms of frost injury in seedlings grown from other portions of the same seed were described. The embryos and seedlings were classified, according to the degree of frost injury apparent, and an attempt was made to correlate the symptoms in the embryo with the symptoms which appeared in seedlings grown from such seed. The different classes of embryos, as regards frost injury, were illustrated by drawings, and the different classes of seedlings by specimens in Riker mounts.

WHEAT MOSAIC IN SOUTH DAKOTA

John T. SLYKHUIS, Departement of Plant Pathology, South Dakota Agricultural Experiment Station, Brookings, South Dakota.

Mosaic caused varying degrees of damage to winter and spring wheat in 16 counties of southern and eastern South Dakota in 1950. Experiments did not indicate that mosaic could survive in soil, ripe straw, or seed, however, it can survive the winter in living winter wheat plants. During the spring and summer it can

spread to other plants. Certain annual grasses, particularly *Setaria viridis*, appear to be important as hosts perpetuating the disease between harvest and the emergence of volunteer and fall-sown wheat. All varieties of wheat recommended for South Dakota are susceptible to the mosaic cultures tested.

METHYL BROMIDE AS A SOIL FUMIGANT FOR CONTROLLING DISEASES AND WEEDS IN TOBACCO SEEDBEDS

R. H. STOVER and L. W. KOCH, Dominion Laboratory of Plant Pathology, Harrow, Ontario.

Greenhouse and outdoor tests were conducted to test the effect of methyl bromide (Dowfume MC_2) on soil-borne diseases and weeds in tobacco seedbeds in Ontario. Complete eradication of the black rootrot fungus (*Thielaviopsis basicola*), and good control of damping-off (*Rhizoctonia* and *Pythium* spp.) was obtained in the greenhouse at dosages as low as 2 ml. per cubic foot of soil at a soil temperature of 61°F. All weeds except clovers and round leaf mallow were destroyed at the 2 ml. per cubic foot rate. The fall treatment of tobacco seedbed soils was shown to be a simple, safe, and economical practice. This treatment is applicable in the burley tobacco belt of Ontario and the cigar tobacco area of Quebec where steaming is not generally practised.

GREY SPECK OF OATS IN SASKATCHEWAN

T. C. VANTERPOOL and D. J. SAMBORSKI, Department of Biology, University of Saskatchewan, Saskatoon, Sask.

Severe grey speck caused by manganese deficiency has been found in an area west of Spalding on a poorly drained, high lime, Yorkton loam. This soil contains 20.45% organic matter and 0.057% MnO, is high in carbonates and has a reaction of pH 8.0. Manganese sulphate spray was the most effective means of control, followed by manure; there was some benefit from cereal straw amendments. Good growth response was obtained from ammonium phosphate when used as a supplement to the manganese spray. There was no evidence of other trace element deficiencies. In tests of recommended cereal varieties, barley was the most resistant cereal to manganese deficiency, followed by vulgare wheat, durum wheat and oats respectively. Field surveys and greenhouse studies indicate that manganese deficiency of cereals is not widespread in the province.

THE DECLINE OF BROWNING ROOT ROT

T. C. VANTERPOOL, Department of Biology, University of Saskatchewan, Saskatoon, Sask.

Fifteen to thirty years ago this was one of the major root rots of cereals in Saskatchewan; nowadays, it is hard to find. Early investigations showed that it could be lessened or economically controlled by the application of phosphatic fertilizers, farmyard manure or straw to the soil, and that although all the common wheat varieties were attacked, Thatcher showed most resistance. There is evidence that these factors in recent years have operated in reducing the disease to minor importance. There has been a forty-fold increase in the sales of phosphatic fertilizers in the last twenty years. The combine has largely replaced the binder and thresher, thus resulting in a return to the land of considerably more straw than formerly. Thatcher wheat has largely replaced Marquis. These appear to be the chief factors concerned.

THE EFFECTS OF SOME STONE-FRUIT VIRUSES ON CUCUMBER

R. S. WILLISON, Dominion Laboratory of Plant Pathology, St. Catharines, Ontario.

One or more strains each, of the cherry yellows, necrotic ring spot, tatter leaf and prune dwarf viruses have been transmitted by juice transfer from peach to cucumber and then serially from cucumber to cucumber. Primary symptoms were

rings or spots, merging into vein-banding and chlorosis, on rubbed cotyledons. Systemic symptoms of the disease induced by the different viruses ranged from marking and distortion of foliage and dwarfing, to death of growing points or of whole plants. Differences between viruses and strains were expressed chiefly as degrees of severity. Some of the viruses have been transmitted to hubbard squash, vegetable marrow, and pumpkin.

AN EXPERIMENT IN CROSS PROTECTION WITH SOME STONE FRUIT VIRUSES

R. S. WILLISON and G. H. BERKELEY, Dominion Laboratory of Plant Pathology, St. Catharines, Ont.

In March, 1949, series of year-old Montmorency trees were inoculated with cherry yellows, necrotic ring spot, prune dwarf, and tatter leaf viruses respectively, and later displayed shock symptoms. Pairs of trees in each series were then reinoculated in March, 1950, with another virus or strain. The second virus, with one possible exception, also induced shock symptoms, sometimes less severe than when infecting healthy plants. It would appear that cross protection by one virus against another was incomplete or wanting under the conditions of the experiment. Whether or not this was due to incomplete systemic invasion has not been fully determined, but the distribution of shock symptoms over the young trees suggests that, in sour cherry, the viruses used in the experiment spread rapidly throughout newly infected trees.

One observation of special interest was that shock symptoms of either of two strains of necrotic ring spot following a previous infection with tatter leaf were different (i) from those occurring when the order of infection was reversed and (ii) from shock symptoms of either disease on previously healthy trees.

WITCHES' BROOM OF POTATO IN BRITISH COLUMBIA

N. S. WRIGHT, Dominion Laboratory of Plant Pathology, Vancouver, British Columbia.

Witches' broom of potato has been transmitted by stem grafts to the x-virus immune U.S.D.A. potato seedling 41956, to the tomato, *Lycopersicon esculentum* var. Bonnie Best, and to *Cyphomandra betacea,* a tropical solanaceous perennial herb.

Symptoms of infection occurred on the above plants about six weeks after grafting and a witches' broom condition ultimately occurred on each suscept. Proof that the observed symptoms were caused by the witches' broom virus was obtained by grafting scions from infected plants to potato. Typical symptoms of witches' broom were produced on the latter.

Numerous attempts have been made to determine the means of natural spread of the witches' broom of potato disease but to date this has not been determined.

PRODUCTION OF STEM RUST SORI ON ALBINO BARLEY

Y. S. WU, Field Husbandry Department, University of Saskatchewan, Saskatoon, Saskatchewan.

Experiments were carried out under greenhouse conditions excepting for the dark experiment which was conducted in the dark room. Albino barley of variety, Stripe, which usually produces 80 to 90% of albino seedlings was used. All albino plants were grown in sand culture supported by a nutrient solution. The albino plants were kept alive by leaf feeding with 10% sucrose solution.

An unknown race or races of *Puccinia graminis tritici* were used for inoculum. The inoculum was applied by rubbing it onto leaves or by injection using a fine hypodermic needle. The inoculation of young seedlings at the 1st- and 2nd-leaf stage, without sugar feeding failed to produce any indication of pustule formation. Numerous uredial sori were formed when the albino leaves were fed with 10%

sucrose solution. The sori were smaller than those formed in the normal green plants. Albinos grown under complete darkness also produced rust sori when fed with sucrose solution.

The uredospores of albino plants did not seem to be different in color, size, and germination as compared with the uredospores of variegated and normal green plants. The uredospores produced from albino plants were injected into normal green plants, which produced pustules in eight days. It indicated that the rust did not lose its pathogenicity on the albino plants.

From these results it appears that green pigment of plants may be only of indirect importance in production of rust sori in plants.

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